

A NEW HYLA FROM CRADLE VALLEY, TASMANIA

BY E. O. G. SCOTT

PLATES I-III

ABSTRACT

The history of the Tasmanian amphibian list, which has been largely influenced by material in the British Museum collected at an early date, is briefly reviewed, and the present position noted. *Hyla burrowsi* sp. nov., the first new frog recorded from Tasmania for three-quarters of a century, is described and figured. It is a medium-sized, slender, attractively coloured non-litorian form, rather closely allied to *H. adelaidensis* Günther, 1858. It appears to be a subalpine species, the type-locality being Cradle Valley, where it was collected by Miss M. Burrows at an altitude of about 3100-3300 feet. A key to the Tasmanian species of the genus *Hyla* Laurenti is provided.

No actual addition to the Tasmanian amphibian list having been made since 1864, the discovery of the existence of a new species in the Island is a matter of some interest. The present paper provides a description and figures of an elegant *Hyla* collected by Miss M. Burrows in Cradle Valley.

Four genera—*Limnodynastes* Fitzinger, 1843; *Crinia* Tschudi, 1838; *Pseudophryne* Fitzinger, 1843; *Hyla* Laurenti, 1768—occur in this State. Species, valid or nominal, that have at various times been admitted to the local faunal list include: 1, *Limnodynastes peronii* (Duméril and Bibron, 1841); 2, *L. tasmaniensis* Günther, 1858; 3, *L. dorsalis* (Gray, 1841); 4, *Crinia signifera* (Girard, 1853); 5, *C. tasmaniensis* (Günther, 1864)*; 6, *C. laevis* (Günther, 1864)*; 7, *C. georgiana* Tschudi, 1838; 8, *Pseudophryne bibronii* Steindaehner, 1867*; 9, *P. semimarmorata* Lucas, 1892; 10, *Hyla peronii* (Tschudi, 1838); 11, *H. ewingii* Duméril and Bibron, 1841*; 12, *H. krefftii* Günther, 1863; 13, *H. calliscelis* Peters, 1874; 14, *H. verreauxii* Duméril, 1854; 15, *H. jervisiensis* Duméril and Bibron, 1841; 16, *H. aurea* (Lesson, 1830): species marked with an asterisk have Tasmania as type-locality (no. 8 Australia and Tasmania); no. 5, however, is the only endemic species.

The scope of our list has been conditioned, to a relatively large degree, by the existence in the British Museum collections of material that came, or is stated to have come, from Tasmania round about the middle of last century, this material relating, in several instances, to species that either have since not been found here at all, or else have been re-encountered only after a lapse of many years. In these circumstances, it will be profitable here briefly to outline the history of the Tasmanian amphibian list—traced up to 1897 by Fletcher (1898)—and to note the present position.

Duméril and Bibron (1841) named our first described frog, no. 11.

Günther (1858) listed seven Tasmanian species—five (nos 2, 8, 10, 11, 16) in the body of the text, two (nos 1, 7) in the Appendix. His attribution of no. 1 to Tasmania is based (p. 134) on 'a. Adult male: not good state. Van Diemen's Land. Presented by Sir A. Smith'. The Tasmanian record of no. 7, based (p. 134) on 'Many specimens. Van Diemen's Land. Presented by Sir A. Smith', is not noted by Boulenger (1882), and has been rejected outright by Fletcher (1898, p. 660), whose example has been universally followed.

Günther (1864) added nos 5 and 6 (as species of *Pterophrynus*: type locality Van Diemen's Land).

Krefft (1866) in his Australian list recorded nos 2, 5, 6, 8, 10, 11 16 (range of no. 16 'Australia generally') as Tasmanian. Later (1869) he gave a list differing from his earlier one in two particulars: (a) no. 8 omitted, and replaced by 'a *Pseudophryne*, discovered by Mr. Masters, and probably new'; (b) no. 10 dropped, and replaced by 'a kind, which I consider to be identical with *Hyla verreauxii*' (the later species, no. 14, is treated by Fletcher, who does not regard it as Tasmanian, as a synonym of no. 11). Fletcher (1898) suggested Krefft (1869) overlooked no. 1 on account of the fact that in Günther's Catalogue it is mentioned only in the Appendix.

Boulenger (1882), with seven (?eight) species, followed Günther (1858 and 1864), except for (a) exclusion of nos 7 and 8; (b) doubtful inclusion of no. 12.

Fletcher (1898) listed ten, nominally eleven, species, nos 1, 2, 3, 4, 5, 6, 9 (as *Pseudophryne bibronii* Günth., var. *semimarmorata* Lucas), 10, 11, 16: he treated no. 12 as a non-Tasmanian, and no. 13 as a Tasmanian (and mainland), variety of no. 11. Of these ten species Fletcher had Tasmanian material (all from 'the north coast or thereabouts') of seven, nos 2, 3, 4, 6, 9 (regarded as a variety of no. 8), 11, 16.

While in Tasmania in 1901-3, English (1910) collected only the seven species just enumerated that had come under Fletcher's personal notice.

Lord and Scott (1924) included ten species, nos 1?, 2, 3, 4, 5, 6, 9 (under heading of no. 8: 'the Tasmanian form of this species is usually referred to as *Pseudophryne semi-marmorata*'), 10?, 11, 16. In regard to the two queried species, nos 1 and 10, Lord and Scott, like writers before and since, pointed out that their attribution to Tasmania rested—as it still does—on a single individual of each species presented to the British Museum by Sir A. Smith prior to 1858.

Blanchard (1929) re-discovered no. 5, which had not been recorded since the original description in 1864, and also obtained examples of nos 3, 4, 6, 8, 11.

In the most recent revision of our batrachia, Loveridge (1934), who employs trinomials, admits nine Tasmanian species: *Limnodynastes dorsalis dorsalis* (Gray, 1841); *L. tasmaniensis* Günther, 1858; *Crinia signifera signifera* (Girard, 1853); *C. tasmaniensis* (Günther, 1864); *C. laevis laevis* (Günther, 1864); *Pseudophryne bibronii* Steindachner, 1867; *Hyla ewingii ewingii* Duméril and Bibron, 1841; *Hyla jervisiensis* Duméril and Bibron, 1841; *Hyla aurea* (Lesson, 1830).

The remaining seven species that have at various times been accredited to Tasmania are dealt with by Loveridge thus. Nos 7 and 14 omitted without comment. Nos 1 and 10—after pointing out the Tasmanian records rest (*vide supra*) solely on Sir A. Smith's specimens, he observes (p. 56), 'In view of the fact that no others have been taken during the past three-quarters of a century, and taking into account the numerous instances of Sir A. Smith having inaccurate locality data on his specimens [a footnote cites examples of Australian lizards, recorded as being from South Africa], it seems reasonable to drop *Hyla peronii*

and *Limnodynastes p. peronii* from the Tasmanian list until such time as they may be proved to actually exist on the island'. In the circumstances, there is a good deal to be said in favour of such a course: it should, however, be borne in mind, first, that the British Museum collections do include specimens of an undoubted Tasmanian species (*L. tasmaniensis*) presented by Sir A. Smith; secondly, that *Crinia tasmaniensis*, described in 1864, was lost sight of till in 1928 Blanchard re-discovered it 'under the first stone turned in search of frogs'. Nos 12 and 13 Loveridge synonymized with *H. jervisiensis*. Finally, with regard to species of *Pseudophryne*, he admits *P. semimarmorata* as a valid species (Fletcher (1898) ranked it as a variety of *P. bibronii*), but determines his specimens from St Patrick's River as *P. bibronii*, and thinks it improbable (though possible) that Fletcher's specimens from Ulverstone really represent *P. semimarmorata*.

Family HYLIDAE

Genus *Hyla* Laurenti, 1768

Hyla burrowsi sp. nov.

(PLATES I-III)

?*Hyla peronii* Günther (*non* Duméril and Bibron), *Cat. Batr. Sal. Brit. Mus.*, 1858, p. 113 (adult Tasmanian specimen, presented by Sir A. Smith, only).
?*Id.* Boulenger, *Cat. Batr. Sal. S. Ecaud. Brit. Mus.*, 1882, p. 390 (same Tasmanian specimen only).

Diagnosis. A medium-sized, slender non-litorian *Hyla*, entering subsection B. 2, α , β in key to Australian species of the genus by Boulenger (1882, p. 347). Distinct web between fingers. Head longer than broad. Tongue subcordate. With hind-limb adpressed, tibio-tarsal articulation reaches nostril, or between nostril and eye. In alcohol, above green, with or without greyish, or greyish and dark bluish, marblings: below whitish or pale brownish, immaculate, except for part of throat, which is greenish, marbled with grey: hinder side of thigh brownish, immaculate, or with a few obsolescent whitish spots.

Description. Size moderate; habit rather slender, non-litorian.

Tongue subcordate, somewhat constricted at about its anterior one-fourth with formation of a rather narrow lobe, shallowly nicked where it overlies mandibular symphysis; free, and very slightly, or slightly, nicked behind (Plate III, fig. 3). Vomerine teeth in two suboval series between choanae, the tooth-line on a level with, or slightly behind, level of choanae. Teeth-series a little oblique, convergent posteriorly; contiguous (female; Plate III, fig. 2) or separated (male; Plate III, fig. 1) by from one-half to two-thirds of width of one group: each series with about 7-9 mostly closely set, rather blunt, subtuberculate, slightly recurved teeth (Plate III, fig. 4).

Head moderate, 2.4-2.5 in total length; 1.2-1.3 times as long as broad. Snout rounded; profile squarish, anterior profile nearly vertical, gently convex; 4.3-4.4 in head; 1.1-1.2 times eye, subequal to orbit. Canthus rostralis straight; angular and very distinct (male), or rather rounded, only moderately distinct (female). Lorcal region oblique, concave. Interorbital space flat; measured between bases of ocular capsules, interorbital 1.4-1.6 times eye, slightly exceeding length of upper

eyelid; measured between anterior canthi, 2.3-2.4 times eye. Direct distance from nostril to eye less than diameter of eye, slightly greater than internarial distance. Tympanum distinct (female), or fairly distinct (male); about half eye.

Forearm 1.0-1.1 in upper arm (axilla-joint), 5.1-5.3 in total length.

Hand (Plate III, fig. 5) rather slender. No distinct rudiment of pollex. Fingers with distinct web. With digits, in sequence from preaxial border of limb, designated I (pollex), II, III, etc., and phalanges, in sequence from proximal phalanx, i, ii, iii, etc., and with extent to which phalanx is webbed indicated by 1.0 (fully webbed), 0.5 (one-half webbed), and so on, a quantitative expression of the webbing is given by the formula: II i, 1.0 and III i, 1.0; III i, 1.0 and IV i, 0.0 (one specimen 0.1); IV i, 0.1 and V i, 0.3. Hence average extent of webbing is 0.6 of phalanx. The separation, in their distal one-third, of metacarpals relating to digits IV and V admits of the formation here of a web with depth exceeding half eye-diameter. With adjacent digits adpressed, tip (including disk) extends: II to III ii, 0.3; III to IV ii, 0.5; V to IV ii, 1.0. Disks larger than those of toes, three-fifths eye. Subarticular tubercles prominent. A very strong transverse fold on wrist.

With hind-limb adpressed to body, tibio-tarsal articulation reaches nostril, or between nostril and eye. Thigh (groin-joint) 1.1-1.2 in lower leg, which is 1.9-2.0 in total length.

Foot (Plate III, fig. 6) fairly broad. Toes strongly webbed: I ii, 0.5 (one specimen 0.9) and II i, 1.0; II i, 1.0 and III ii, 1.0 or 0.9; III iii, 0.5 (one specimen 1.0) and IV ii, 1.0 or 0.9; IV ii, 1.0 or 0.9 and V ii, 1.0 (one specimen 0.7). Hence average extent of webbing is 1.5-1.6 phalanges. Along preaxial border of II, III, IV web is continuous with narrow fringe extending to disk. From preaxial border of I i a distinct web runs to the (single) large metatarsal tubercle, which, standing out approximately parallel with the digit, functions as a pre-hallux: from tubercle, whose tip is just free of webbing, the web, continuing towards body, shortly merges into the well-developed tarsal fold. With adjacent digits adpressed, tip (including disk) extends: I to II ii, 0.5-0.6; II to III ii, 0.7-0.8; III to IV ii, 0.9-iii, 0.1; V to IV ii, 1.0-iii, 0.5. A thin slip of ordinary integument, concolorous with that on dorsum of metatarsus, runs from near base of digit IV to outer margin of web between IV and V: a less distinct, smaller, elongately triangular slip, almost concolorous with web, on outer part of web between IV and III. Subarticular tubercles fairly prominent. Outer metatarsals fully united.

Upper surfaces quite smooth, or with a few small scattered tubercles. Belly, chest, throat, underside of thighs granulate: chin smooth. Fairly strong fold from eye, over tympanum, to shoulder, where it meets a pronounced glandular fold from angle of mouth. More or less distinctly glandular lateral fold from axilla to, or nearly to, groin. Slight or moderate fold across chest. An apparently glandular region along postaxial border of forearm. Male with internal subgular sae.

There is considerable variation in the dorsal colour-pattern, particularly on the body (Plate II, figs 1a, 2a, 3a). In alcohol, upper surface of head and body of female dark olive, immaculate: of male dark green, mottled, slightly on head, heavily in hinder one-third of body, with greyish; or dark bluish, with large irregular patches of green, most numerous on head, and with smaller, scattered whitish (in occipital region somewhat brownish) marblings. Excluding digits, upper surfaces of limbs of female olive, immaculate; an irregular yellowish streak along hinder edge of upper aspect of thigh: of male marbled with dark bluish and pale greyish, and with numerous largish green blotches. In hand digits II and III of medium brown, the latter digit slightly marbled proximally with lighter (in both sexes);

IV and V greenish with some fawn mottling distally in female; mottled whitish, and greenish or dark grey in male. In foot digit I brown, immaculate; II brown, moderately mottled with fawn; III brownish or dark grey, mottled with fawn: IV and V in female greenish, slightly mottled with fawn; in male dark bluish grey, heavily mottled with pale greyish. The green patches on upper surfaces of head, body, and limbs commonly have a somewhat lichenoid facies, suggestive of their being, as it were, plastered on. A narrow dark streak along canthus rostralis. From below eye to beyond angle of mouth a bright green, or yellowish green, region, which in female, but not in male, expands posteriorly to delimit hinder border of tympanum. From just behind tympanum to, or nearly to, groin a lateral band of dark, somewhat bluish grey, with numerous, generally longitudinally elongate, whitish spots, which may anastomose to form lines or reticulations: this band bordered above by an obscure stripe of green paler than that on back. Groin immaculate, pale brown or flesh-colour. Belly and chest light brownish: chin, and in female and in one male fore part of throat, greenish, mottled with greyish white (Plate II, figs 1*b*, 2*b*, 3*b*). Lower surfaces of limbs chiefly yellowish flesh colour or pale brownish. No dark rugosities on digit II of males taken in January. Glandular region surrounding vent dark slate-grey, spotted with white or light brown: a very small reddish brown spot just above vent usually present. Hinder side of thighs light brownish or dark brown: immaculate, save for presence, in one male, of a few very small obsolescent whitish spots.

In life the general colouration showed some variation. Upper surfaces of head and body uniform bright light green, becoming somewhat more yellowish green on parts of the limbs (female): or very dark brown, peppered with pale fawn (in some lights with golden iridescence), and with large irregular lichenoid patches, in the aggregate exceeding in area the ground colour, of rich marchantia green (larger male): or rich light green, with small scattered putty-coloured spots, the pale putty becoming the basal colour behind pelvic girdle, where there are a few green blotches (smaller male). Lower surface of body flesh-coloured; or dingy, somewhat pinkish white; or greyish: in all cases with small, low whitish tubercles. Lower surface of head rather darker than that of body, with irregular, flake-like white mottlings on throat; sometimes a faint glimmer of rose on chin. Lower surfaces of limbs dark flesh-colour, approaching light rose on the thigh. Pupil black. Iris golden, or dusky golden; with or without a complete or partial narrow black outer annulus. Roof of oral cavity pale bluish white; floor whitish. Tongue deep cream.

Types. Described and figured from the holotype male (Q.V.M. Reg. No. 1941. 41), 54.0 mm. in total length (snout-vent); the allotype female (Q.V.M. Reg. No. 1941. 40), 50.0 mm. in total length; and a paratype male (Q.V.M. Reg. No. 1941. 42), 51.5 mm. in total length. Donated by Miss M. Burrows, in whose honour the species is named. An additional specimen (Q.V.M. Reg. No. 1940. 51), which was obtained by Miss Burrows in the gorge of the Fury River, Cradle Mount-Lake St Clair Scenic Reserve, in January, 1940, and which escaped from captivity, to be found again some months later in a dried state, has also been examined.

Locality. Cradle Valley, Tasmania. Female and smaller male collected clinging to button-grass, *Gymnoschoenus sphaerocephalus* Bentham, on edge of small pond near Dove Lake, 7th January, 1941, approximate altitude 3100 feet: larger male from pond near Wombat Tarn, between Lake Lilla and Crater Lake, 15th January, 1941, approximate altitude 3300 feet.

Affinities. *H. burrowsi* would appear to enter subsection B, 2, α , β in the key to Australian species of *Hyla* provided by Boulenger (1882, p. 347). If, by a liberal interpretation of the amount of webbing of the fingers, it were referred

to section A (p. 346), it would, on this score, bear comparison with two only of the species therein included: from one of these, *H. peronii*, it is differentiated in the subjoined key; from the other, *H. caerulea*, it differs in shape of tongue, narrower head, longer hind limb, absence of large pores on occipital and temporal regions. As suggested in the synonymy, it is possible—though perhaps not probable—that the single Tasmanian, or supposedly Tasmanian, specimen in the British Museum (received from Sir A. Smith prior to 1858) determined as *H. peronii* may be referable to the present species.

Subsection B, 2, a, β of Boulenger's key comprises *H. jervisiensis*, *H. krefftii* (which is probably synonymous with *H. jervisiensis*), *H. adalaidensis*, and *H. aurea*. The relationship of *H. burrowsi* with the three (nominally four) of these species occurring in Tasmania is indicated in the key given below. From the slender *H. adalaidensis*, which is perhaps on the whole its closest ally, the present species may be distinguished by its less acuminate snout, more extensive webbing on fingers, smaller tympanum, granulation of throat, absence of white or pink streak from eye to middle of side.

English (1910, p. 633) states that in Tasmania *H. aurea* is confined to the country drained by the North Esk, South Esk, Tamar, and Mersey rivers: while our present knowledge of the distribution of our frogs is admittedly meagre, such evidence as I have been able to gather certainly suggests its absence from the Central Plateau. It seems not unlikely, therefore, that *H. burrowsi* may be regarded as the subalpine analogue of the northern coastal and lowland *H. aurea*. Specimens placed in water behave much like examples of *H. aurea* under similar conditions: while quite capable of swimming strongly and gracefully, they nevertheless commonly either make hastily for the side of the tank, or else float lazily, with the body held obliquely, hind limbs widely spread, and tip of snout just protruded above the water.

In the following key to the Tasmanian species of *Hyla* (in which, for convenience, the doubtfully Tasmanian *H. peronii* is included) the definitive characters for *H. e. ewingii* and *H. jervisiensis* are based on Loveridge (1934), who states that, while other average differences of webbing, limb-length, etc., are of assistance when comparative material is available, he found the features cited are the only safe characters available to distinguish the two species occurring in Tasmania.

KEY TO TASMANIAN SPECIES OF HYLA

- A. Fingers quite free. Disks very small, less than half tympanum *H. aurea*
- AA. Fingers with at least a rudiment of web. Disks moderate or rather large, more than half tympanum
 - B. With hind limb adpressed, tibio-tarsal articulation reaches beyond the eye
 - C. Habit slender. Head longer than broad. Groin immaculate. Hinder side of thigh immaculate, or with a few very small obsolescent whitish spots. Digit IV of foot webbed for about half its free length *H. burrowsi*

- CC. Habit moderate. Head broader than long.
Groin mottled with dark brown or black
and yellow. Hinder side of thigh
mottled dark brown or black, and yellow.
Digit IV of foot fully, or virtually fully,
webbed *H. peronii*
- BB. With hind limb adpressed, tibio-tarsal articu-
lation reaches the eye, or not so far
- D. Hinder side of thigh red. Size smaller
(Loveridge's largest male 32 mm.,
largest female 37 mm.) *H. cwingii*
- DD. Hinder side of thigh yellow. Size larger
(Loveridge's largest male 38 mm.,
largest female 45 mm.) *H. jervisiensis*

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PLATE I

HYLA BURROWSI SP. NOV.

Side view of holotype male (Q.V.M. Reg. No. 1941. 41). Total length (snout-vent) 54.0 mm. Pond near Wombat Tarn, between Lake Lilla and Crater Lake, Cradle Valley, Tasmania; altitude about 3300 feet. (Figure is approximately three times natural size).

(Photograph by H. J. King)



PLATE II

HYLA BURROWSI SP. NOV.

COLOUR-PATTERN

Fig. 1.—Holotype male (Q.V.M. Reg. No. 1941. 41). Pond near Wombat Tarn, between Lake Lilla and Crater Lake, Cradle Valley, Tasmania; approximate altitude 3300 feet. Total length (snout-vent) 54.0 mm. (figure is approximately natural size).

1a. Dorsal aspect.

1b. Chin and throat.

Fig. 2.—Allotype female (Q.V.M. Reg. No. 1941. 40). Found clinging to button-grass, *Gymnoschoenus sphaerocephalus* Benthams, on edge of small pond near Dove Lake, Cradle Valley; approximate altitude 3100 feet. Total length 50.0 mm. (figure is approximately natural size).

2a. Dorsal aspect of head and body. Semi-diagrammatic.

2b. Chin and throat.

Fig. 3.—Paratype male (Q.V.M. Reg. No. 1941. 42). Same locality as female (Fig. 2). Total length 51.5 mm. (figure is approximately natural size).

3a. Dorsal aspect of head and body. Semi-diagrammatic.

3b. Chin and throat.

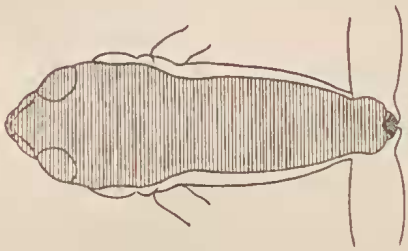
KEY TO COLOURS

In all figures in this plate colours are indicated by the following conventions.

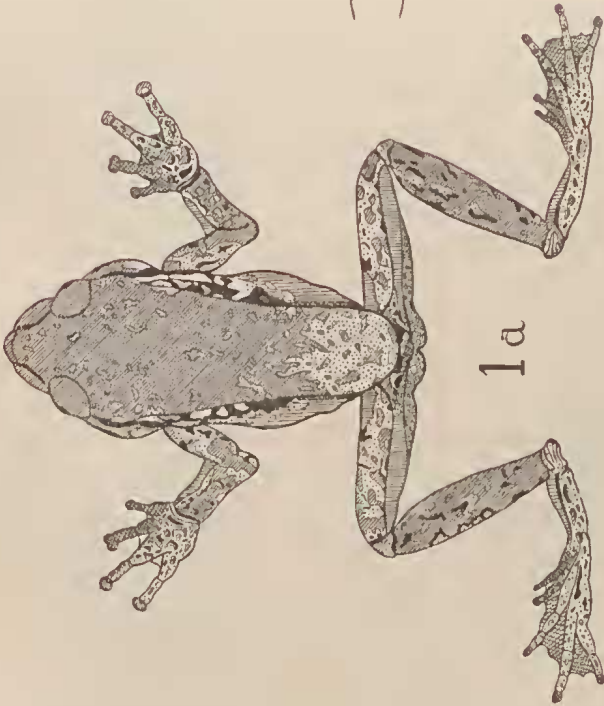
Olive	Horizontal lines.
Dark green	Oblique lines, with top of line to right of bottom of line.
Bright green	Oblique lines, with top of line to left of bottom of line.
Brown, and fawn	Cross-hatching.
Black, and dark bluish	Solid black.
Flesh colour	Vertical lines.
Grey	Stippling.
White	Unshaded.



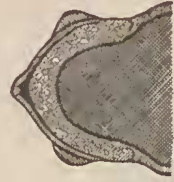
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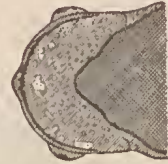
2a



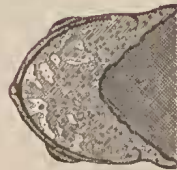
1a



3b



2b



1b

PLATE III

HYLA BURROWSI SP. NOV.

- Fig. 1.—Palate of holotype male (Q.V.M. Reg. No. 1941. 41). Note suboval, oblique, posteriorly convergent vomerine teeth-series, lying slightly behind level of choanae; the two series separated by about half the width of one group. Approximately twice natural size.
- Fig. 2.—Palate of allotype female (Q.V.M. Reg. No. 1941. 40). Note vomerine teeth-series are here contiguous. Approximately twice natural size.
- Fig. 3.—Mouth of holotype male, showing tongue. Approximately two and a half times natural size.
- Fig. 4.—Semi-diagrammatic view of vomerine teeth. Approximately x 35.
- Fig. 5.—Palmar aspect of right manus of holotype male. Approximately twice natural size.
- Fig. 6.—Plantar aspect of right pes of holotype male. Approximately twice natural size.

